Electrochemically reduced water, a type of functional water, has reactive oxygen species scavenging activity in HT1080

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Introduction: There are many functional waters that give us benefits such asdisease prevention and cure Of these, electrochemically reduced water（ERW）exhibits an alkaline pH, contains richly dissolved hydrogen (H_2), and a small amount of platinum nanoparticle. As a result of such characteristics, ERW has reactive oxygen species (ROS)-scavenging activity (1). Also, recent studies demonstrated that H_2-dissolved water exhibits ROS-scavenging activity (2). Thus, the anti-oxidative capacity of ERW is postulated to be dependent on the presence of H_2 levels; however, there is no report verifying the role of dissolved H_2 in ERW. In this report, we clarify whether the responsive factor for anti-oxidative activity in ERW is dissolved H_2.

Methods: We used human the fibrosarcoma cell line HT1080. Change in the water quality with electrolysis intensity was evaluated by pH, electrical conductivity, oxidation-reduction potential, dissolved oxygen, and dissolved hydrogen. Intracellular ROS scavenging activity of ERW and H2-dissolvedwater was tested by using 3'-O-Acetyl-6'-O-pentafl-uorobenzenesul-fonyl-2',7'-difluorofluorescein （BES-H_2O_2）, oxygen radical absorbance capacity（ORAC）assay, and the 2,2-diphenyl-1-picrylhydra-zyl （DPPH）assay. Transition of ERW compositional factor with the degree of electrolysis intensity was detected by ICP-MS. Observation of platinum electrode was used by scanning electron microscope (SEM).

Results and Discussion: We confirmed that ERW possessed electrolysis intensity-dependent intracellular ROS-scavenging activity and ERW exerted significantly superior ROS-scavenging activity in HT1080 cells than the equivalent level of H_2-dissolved water (Fig.1). ERW retained its ROS-scavenging activity after removal of dissolved H_2, but lost its activity when autoclaved (Fig.2). ORAC assay and the DPPH assay could not detect radical-scavenging activity in both ERW and H_2-dissolved water. We searched for Pt from 62 elements that increased in amount in an electrolysis-dependent manner by ICP-MS analysis and grasped that the surface structure appeared to be a sheet of aggregated nanoparticles by using SEM (3). These results indicate that ERW contains electrolysis-dependent H_2 and an additional anti-oxidative factor predicted to be platinum nanoparticles

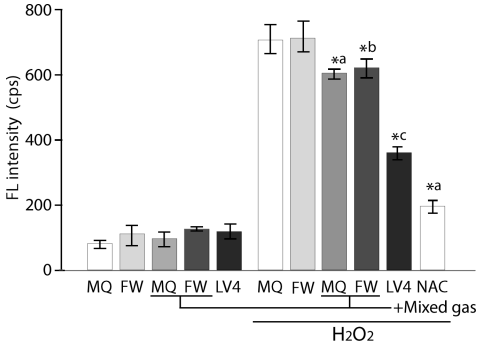

FIg. 1

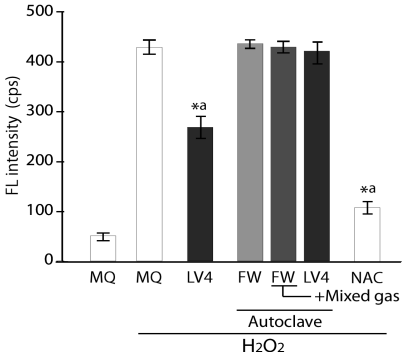

FIg. 2

References:

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